

**GOVERNMENT OF TELANGANA
ABSTRACT**

MA& UD Department - Telangana Cool Roof Policy 2023-2028– Orders – Issued

MUNICIPAL ADMINISTRATION & URBAN DEVELOPMENT (Pig.III) DEPARTMENT

G.O.Ms.No.50

Dated:31.03.2023

ORDER:

Climate change, especially the extreme variance in climatic conditions including heat waves, excessive rainfall and extreme variance in temperatures within a day / in a season is happening faster than before. In this regard, intensified heat conditions, heat stress and extreme heat waves are becoming more regular.

2. The effect of hot climatic conditions is more severe in urban areas. Urban areas by its very nature involves densified construction, converting open spaces into paved ones, higher density of roads and paved surfaces and heat-tapping roofs. These hot surfaces worsen the effects of heat wave conditions. Thus, the phenomenon of “urban heat island” is driving higher temperatures and requiring greater energy per unit of space to reduce the “urban heat island” effect. Heat stress hits the poor and the vulnerable hardest with people living in slums and in lower income communities. The resultant usage of cooling equipment such as air-conditioners in urban areas is further leading to rising greenhouse gas emissions.

3. Telangana is pre-dominantly an urban state with 47% of its population living in urban areas making Telangana as the third most urbanised State in the Country. The State has 143 Urban Local Bodies including GHMC and 13 Municipal Corporations. The State since its formation in June 2014 has initiated a number of urban focussed initiatives including urban infrastructure Specific Purpose Vehicles (SPVs) such as Strategic Road Development Programme (SRDP), Hyderabad Road Development Corporation Ltd. (HRDCL), Comprehensive Road Maintenance Programme (CRMP), Strategic Nala Development Programme (SNDP), among others, and came out with a New Municipal Act called The Telangana Municipalities Act in 2019. These initiatives have ensured that Hyderabad has become the fastest growing City in the Country in terms of its Real Estate growth and it is estimated that more than 50% of State population will be in urban areas in next 5 years.

4. Telangana Government in a pro-active manner and in order to effectively address the issue of “urban heat island” effect, greenhouse gas emissions and an urgent need to control urban heat stress, acknowledges that one of the simplest and cost-effective solution to address these challenges is adoption and implementation of Cool roofs as it saves energy, increase thermal comfort and reduce cooling demand in the long run. Cool roofs function primarily by reflecting more sunlight incident on the roof back to the atmosphere than a regular roof surface. Cool roofs are accepted internationally as an effective energy and money-saving strategy that keeps cities cooler and reduces the urban heat island effect.

5. Building on the success of the cool roofs pilots in the State and considering its impact, Government of Telangana have brought out the "Telangana Cool Roofs Policy 2023-28". The Policy suggests adoption of cool roof as a measure for implementation to build resilience against extreme heat, improve thermal comfort and move the State of Telangana towards reducing urban heat islands affect. The Policy suggests a target-based approach to increase the percentage of cool roofs in the State, achieving around 300 Sq.kms of cool roof area by the year 2028.

6. Policy Objectives:

The Telangana Cool Roofs Policy aims to meet the following objectives:

- 1) Drive rapid state-wide adoption of cool roofs to save energy, strengthen heat resilience and increase thermal comfort.
- 2) Create institutional framework to implement the city-wide cool roof application.
- 3) Identify financing frameworks and outreach and awareness of building tools for implementing cool roofs.
- 4) Support workforce development and training programs for cool roof installation

7. Targeted building categories: Cool roof programme shall be implemented in respect of following categories of buildings:

A) Mandatory

- 1) **Government, Non-Residential & Commercial Buildings:** Mandatory cool roofing for all the Government, Government-owned, Non- Residential and Commercial buildings irrespective of site area / built-up area.
- 2) **Residential:** Mandatory cool roof application for all the residential buildings that have plot area of 600 sq.yds and above. Optional / Voluntary for the buildings that have plot area of less than 600 sq.yds.
- 3) **Government assisted Housing scheme:** Cool roofing for all Government low-income housing constructions.

B) Optional:

- 1) Buildings that have installed roof top solar systems, may also adopt cool roofs for better thermal comfort.
- 2) Retrofitting of all non-residential buildings in next 3 years.
- 3) All residential buildings that have plot area of <600 Sq Yards also to adopt cool roofing.

: 3 :

8. This policy is applicable for a period of 5 years from the date of notification of this Policy. The Policy shall be reviewed by MA&UD department as and when required.
9. GHMC in GHMC area, HMDA in Hyderabad Urban Agglomeration and DT&CP in the rest of the State is hereby appointed as the Nodal Agency for the effective implementation of the cool roof application across the State and TSbPASS will be coordinating overall from the implementation point view.
10. The implementation schedule, agencies and methodology is specified in the Telangana Cool Roof (TCR) Policy 2023-28 which is annexed to these orders.
11. This Policy comes into effect from 1st April, 2023.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF TELANGANA)

**ARVIND KUMAR
SPECIAL CHIEF SECRETARY TO GOVERNMENT**

To

The Commissioner, GHMC, Hyderabad

The Metropolitan Commissioner, HMDA, Hyderabad

The Commissioner & Director of Municipal Administration, Telangana, Hyderabad

The Director of Town & Country Planning, Telangana, Hyderabad

Copy to:

OSD to Minister (MA&UD)

SF/SC

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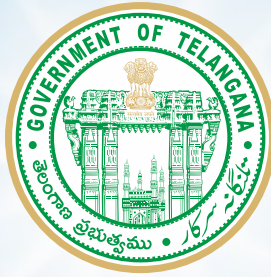
SECTION OFFICER

SF



Sri K. CHANDRASEKHAR RAO

Hon'ble Chief Minister,
Telangana State.

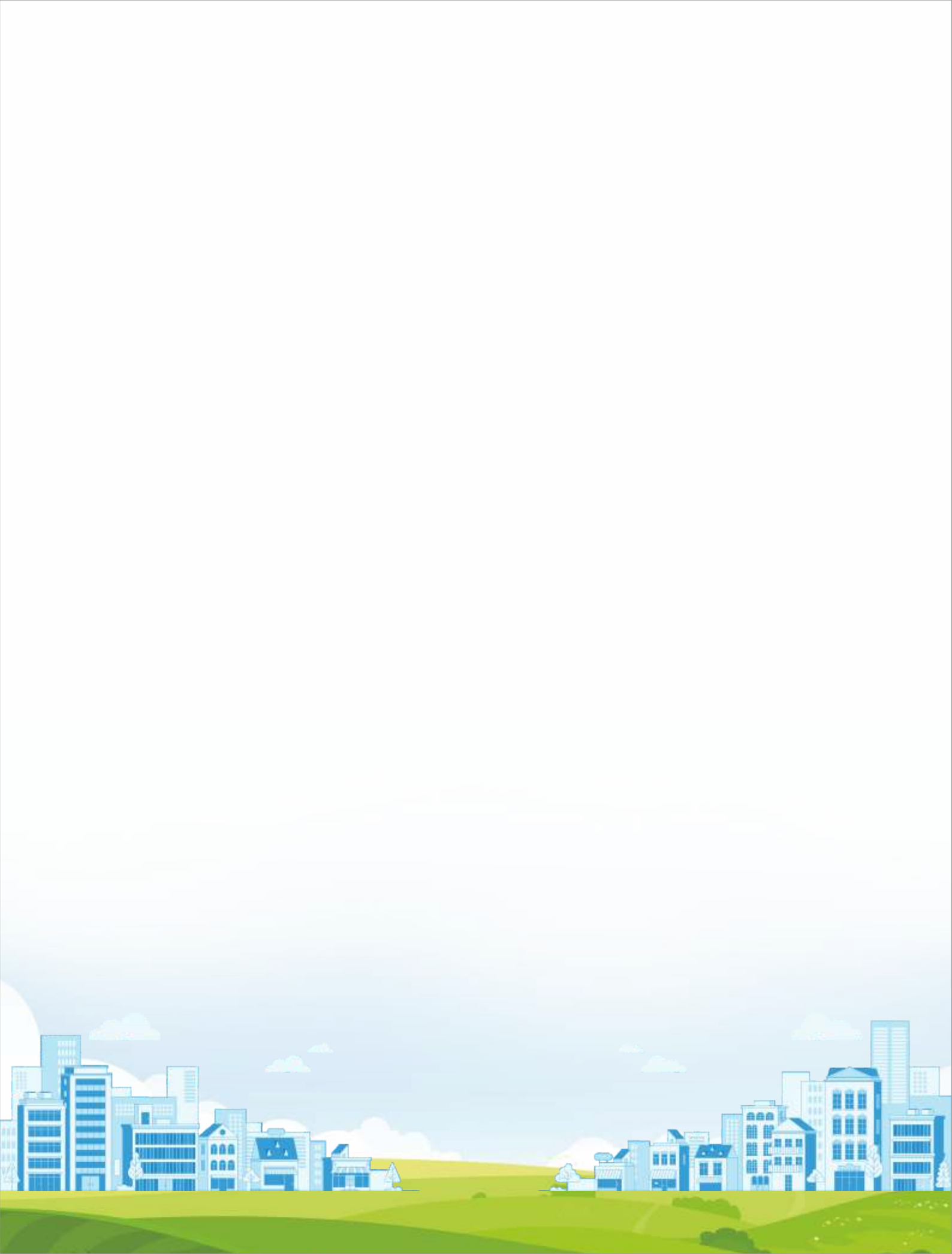


Sri K. T. RAMA RAO

Hon'ble Minister for MA & UD,
Industries and IT E & C,
Government of Telangana.

TELANGANA COOL ROOF POLICY 2023 - 2028







K. T. RAMA RAO

Hon'ble Minister for MA & UD, Industries and IT E & C, Government of Telangana.

MESSAGE

Urbanisation being the engine of growth, is an inevitable outcome of development process. Increasing urbanisation, implies the heat island effect, driving temperatures higher, poor air quality, and the need of greater energy to keep oneself cool with fans and air-conditioning. Cool roofs offer a simple and cost-effective solution to urbanization challenges.

Telangana is an urban state. About 47% of its population stays in urban areas making it the third most urbanised state in the country. Hyderabad is the fastest growing urban agglomeration in the country and thus the process of urbanisation is going to grow at even more rapid pace. We thus need cost effective climate friendly cooling solutions that help to prepare communities to cope with heat stress and also reduce urban heat island effect.

Building on the success of the cool roofs' pilots in the state undertaken in the year 2017, the Telangana Cool Roofs Policy 2023-28 suggests adoption of cool roof as a measure for implementation to build resilience against extreme heat, improve thermal comfort and move the State of Telangana towards reducing urban heat islands in its cities. We intend following a target-based approach and aim to achieve atleast 300 sq. kms of cool roof area by the year 2028.

Telangana vision is to make state a more thermally comfortable, a heat resilient state and coupled with our focus on greening Telangana, we aim to be an eco-friendly state with reduced dependence on energy consumption for cooling and thereby not only bring down our energy consumption but also, lead to reduced CO2 emissions.

We have a progressive builders community and together, we will make Urban Telangana esp. Hyderabad Urban Agglomeration (HUA) a cooler and eco-friendly destination.

A stylized, handwritten signature in black ink, appearing to read 'K. T. Rama Rao'.

K. T. RAMA RAO



ARVIND KUMAR, IAS

Special Chief Secretary, Municipal Administration and Urban Development Department, Metropolitan Commissioner, Hyderabad Metropolitan Development Authority and Commissioner & Ex-Officio Special Chief Secretary, I & PR Department

FOREWORD

While Telangana has kept pace with increasing urbanisation by investing in urban infrastructure, the fact remains that the cities have lesser open spaces and the concretisation often lead to heat trapping and heat stress. In fact, buildings are one of the major contributors to continuous heat generation.

The Telangana State Cool Roof Policy 2023-28 aims at creating simple solutions that can be scaled up at the state level to bring down the urban heat impact in the process. There is a strong need to provide a good quality life in urban areas while protecting the environment. The state is ready to adopt the cool roofing policy.

In Phase one, we are making it mandatory for all government buildings as well as all non-residential establishments including office spaces, retail complexes, hospitals, shops, hotels, industrial and educational institutions and healthcare institutions to be necessarily adopting cool roofing under the act. We have also made cool roofing mandatory for residential plots of more than 600 sq. yards. We have incorporated the Cool roofing provision under TSBPASS.

Starting with Energy Conservation Building Code (ECBC) Programme, Telangana has always been the flag bearer in implementing climate change policy and implementation.

I wish to acknowledge the contribution of our knowledge partners - Administrative Staff College of India (ASCI), International Institute of Information Technology (IIIT-H), Natural Resources Defense Council (NRDC) & Plaksha University, among others in our effort to bring out this policy

ARVIND KUMAR, IAS

INDEX

01	PREAMBLE	01
02	ABOUT COOL ROOFS	04
03	GLOBAL INITIATIVES	09
04	VISION & MISSION	11
05	POLICY OBJECTIVES	12
06	COOL ROOF POLICY TARGETS	13
07	IMPLEMENTATION STRATEGY	16
08	POLICY PERIOD	17
09	NODAL AGENCY	18
10	POLICY MEASURES	19
11	PROCESS OF IMPLEMENTATION	24
12	COOL ROOFING MATERIAL	25
13	PROGRAM PARTNERS AND INSTITUTIONAL MECHANISM	27

Climate change is making extreme events such as heat waves more severe and more frequent. The Intergovernmental Panel on Climate Change (IPCC)'s recent Report on Climate Change Impacts, Adaptation, and Vulnerability highlighted that intensifying heat and humidity in India could be increasingly challenging for people to survive. Extreme heat is not merely a public inconvenience: it can seriously endanger public health.

In addition to rising temperatures, climate change and rising income levels increase the demand for cooling leading to a rise in greenhouse gas emissions. India witnessed one of the hottest months of March in over a century in 2022. A staggering 323 million people in India are at a high risk due to heat, as they lack access to cooling. Heat stress hits the poor the hardest with people living in slums and low-income communities particularly vulnerable to health hazards

323 Million
People in India
are at a High
Risk Due to
Heat



The State of Telangana being in Deccan Plateau is vulnerable to heat waves owing to its geographic and topographical context. In addition to its geographical location, Telangana is on a high growth trajectory with rapid urbanisation, increasing the demand for cooling. Telangana is the 3rd most urbanised state in the country, with 47% of its population as urban. This is likely to exceed 50% soon. While cities act as engine of growth, the growing urbanisation also converts open space into heat-trapping roofs and roads. These hot surfaces worsen the urban heat island effect, drive temperatures higher, requiring more energy to cool indoor spaces.



**Telangana is the
3rd
Most Urbanised State
in the Country**

To meaningfully counter some of these urban challenges, Telangana needs cost effective and climate friendly cooling solutions that help to prepare communities to cope with extreme heat while addressing the urban heat island effect. One such solution is Cool Roofs, which can help to address extreme heat by reflecting some of the sun's incoming radiation back out to the atmosphere, reducing heat retention in buildings and the subsequent quantum of air conditioning to cool indoor spaces.

In 2019, Government of India released a national document titled the **'India Cooling Action Plan (ICAP)'**, providing an integrated vision towards cooling across sectors encompassing inter alia reduction of cooling demand, refrigerant transition, enhancing energy efficiency and technology options with a twenty-year time horizon.



**India Cooling
Action Plan (ICAP),
A National Document
Released in 2019**



The ICAP provides short, medium and long-term recommendations across different sectors aimed at providing sustainable cooling and thermal comfort for all.

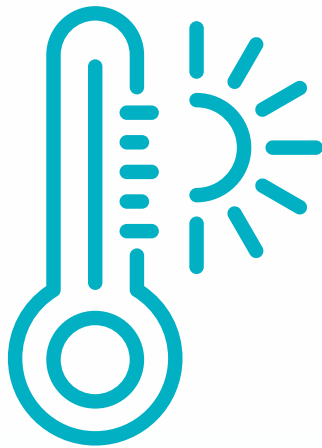
Reducing cooling energy demand is key to implementing the ICAP, it proposes an approach that reduces the cooling energy demand through climate appropriate and energy efficient building design, and low-cost strategies such as cool roofs. It specifically recommends cool roof programmes to provide thermal comfort for Economically Weaker Sections (EWS) and Low-Income Groups (LIG) through local Heat Wave Action Plans. Similarly in India's National Mission on Sustainable Habitat under the National Action Plan on Climate Change, cool roofs techniques are recommended to be promoted in new developments in peri-urban areas for all new constructions.

ICAP

recommended CRP to Provide Thermal Comfort for EWS & LIG



Cool roofs are one of the simplest and most cost-effective ways to fight heat. Depending on various parameters such as location, type of roof, reflectance of the cool roof material etc., cool roofs can help to keep indoor air temperatures lower by, as much as 2.1 to 4.3°C as compared to traditional roofs. Some research studies have shown that city-wide installations of highly reflective roofs and pavements, along with planting shade trees, has a potential to reduce a city's ambient air temperature by 2°C in summer months.



**The Most
Cost-Effective
Method to
Fight Heat**

**Lowers Indoor Air
Temperatures by
2.1 to 4.3°C**



COOL ROOFS

WHAT THEY ARE AND HOW THEY WORK

What are Cool Roofs?

Painted with solar reflective paint, covered in white tiles, or with white membrane, cool roofs are an easy and cost-effective way to help fight climate change by mitigating the urban heat island effect and reducing cooling demand.



How Does it work?

A cool roof takes in less heat from the sun than regular roofs. It stays relatively cool in the sun by reflecting sunlight to (minimize solar absorption) and emitting thermal radiation (to help dissipate solar heat gain). Cool Roofs reflect around 80% of sunlight as compared with 20% from regular roofs. Thus, buildings with cool roofs stay significantly cooler.

★ Benefits ★

COOLER HOMES

Cool roofs can help keep indoor temperatures

2.1 - 4.3°C

lower than households with traditional roofs.



LOWER COSTS

Cool roofs need limited maintenance and can save

20%

in energy costs, and can increase the longevity of the roof beneath them.



Regular Roof



Cool Roof

Application of cool roofs can help save energy, increase thermal comfort, and reduce cooling demand in the long run. The roof is an important component of the building envelope, having a direct impact on building's energy needs and ensuring thermal comfort to its occupants. Cool roofs function primarily by reflecting more sunlight incident on the roof back to the atmosphere than a regular roof surface. Cool roofs are accepted internationally as an effective-energy and money-saving strategy that keeps cities cooler and reduces the urban heat island effect. Cool roofs reflect sunlight and absorb less heat.



**Saves Energy,
Increases
Thermal
Comfort &
Reduces
Cooling
Demand**

Leading cities across the world have adopted cool roof programs. Cool roofs need limited maintenance, and a cool protective coating can be reapplied periodically depending on the product and the sub-surface. It also increases the longevity of the roof beneath it. This combined with an estimated maximum 20% savings on air conditioning costs of the building make cool roofing very cost effective in the long run.

In 2017, the city of Hyderabad initiated a pilot cool roof program led by the Municipal Administration and Urban Development (MAUD) Department of the Government of Telangana and the Greater Hyderabad Municipal Corporation (GHMC). These initial programs included citizen awareness campaigns, pilot initiatives targeting many roofs, cooperation with businesses, and applying cool roof techniques on low-income communities' households.



2017 Hyderabad Initiated a Pilot Cool Roof Program by MA&UD and GHMC

Experience has shown that often the initial material costs are comparable with traditional roofing materials and can also be applied on existing buildings. Low-income communities are among the most susceptible to extreme heat because of their lack of access to cooling. Compounding matters further, their roofs are often made of heat-trapping materials such as tin sheets, cement sheet (asbestos), plastic and tarpaulin without sufficient ventilation.

The State of Telangana, situated on the center-south stretch of the Indian peninsula on the high Deccan Plateau, is the 12th largest state, with a geographical area of 112,077 sq.kms and the 12th most populated state with nearly 35 million residents. It is also the 8th largest economy in the country and is rapidly growing with an evolving hub for robust IT software, industry and services sectors.

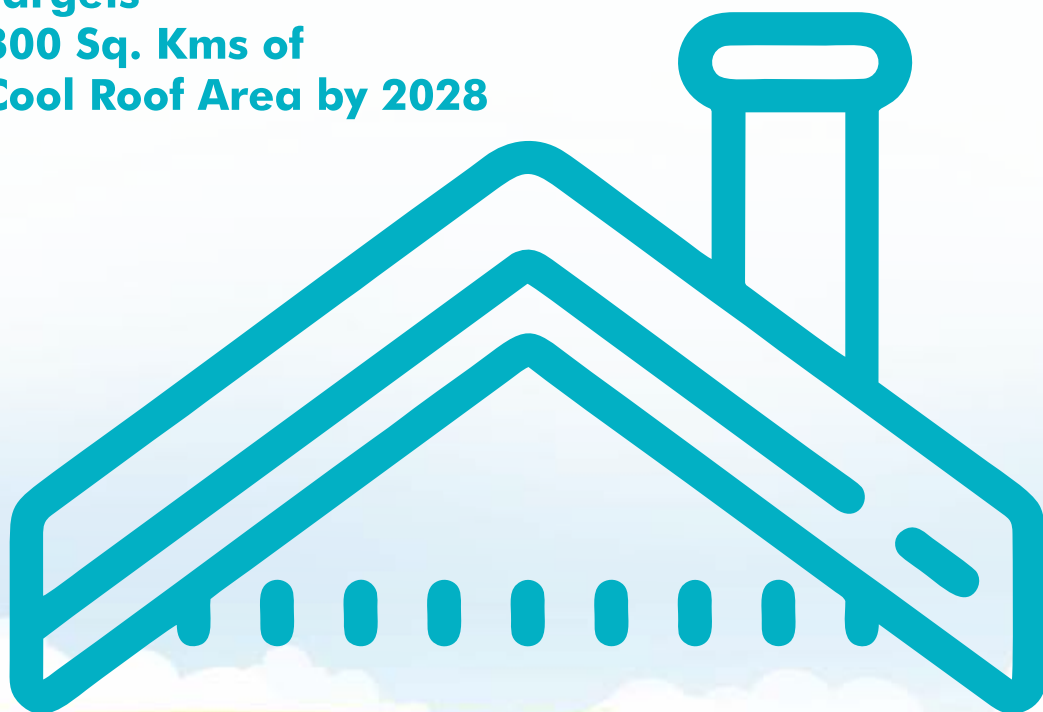
Within Telangana, Hyderabad, the state capital, is the fastest growing city of India. With a population of about 3.9 million it is the sixth most populous urban agglomeration in India. The city is fast establishing itself as the most preferred business destination and increasingly being identified as the next technology capital of the country.

As the state works to improve living and housing conditions in urban neighbourhoods, the use of cool roofs provides an important opportunity to impact human health and comfort in the state and the city of Hyderabad. Particularly for low-income communities, cool roofs provide increased thermal comfort that can also lead to improved productivity, as these homes are also places of work for a large proportion of the low-income community.

Building on the success of the cool roofs' pilots in the state, the Telangana Cool Roofs Policy suggests adoption of cool roof as a measure for implementation to build resilience against extreme heat, improve thermal comfort and move the State of Telangana towards reducing urban heat islands in its cities. Considering the benefits of cool roofs, Government of Telangana developed this policy with a target-based approach to increase the percentage of cool roofs in the state, achieving around 300 sq. kms of cool roof area by the year 2028.

Govt. of Telangana Developed CRP with a Target-based Approach

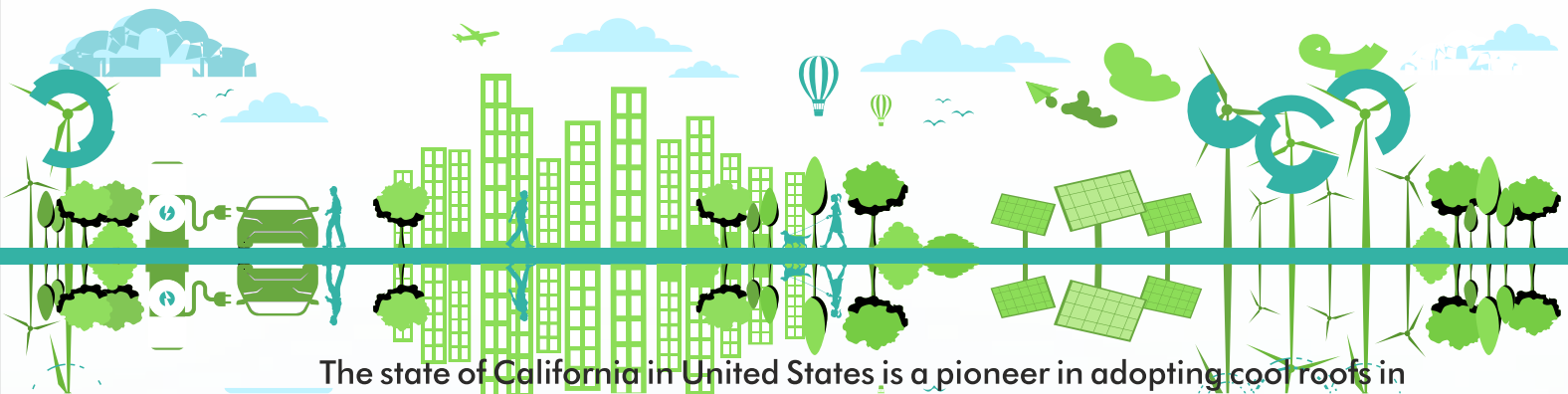
**Targets
300 Sq. Kms of
Cool Roof Area by 2028**





Leading cities across the world are recognizing the benefits associated with cool roofs and have introduced initiatives encouraging adoption of cool roofs. The city of New York in United States started a cool roofs program in 2009 that targeted cool roof coverage of one million square feet every year. Led by the New York Department of Small Business Services and supported by the New York City Mayor's Office of Recovery and Resiliency, the program provided training and skills to applicants with the aim of providing full employment as an added benefit for the city. By 2013, the city had 5,753, 569 sq.ft (0.53 sq.kms) of rooftop cooled, saving more 1500 tons of CO₂e.

The city of New York Started a CRP in 2009 & Targeted 1 Million Sq.Ft. Every Year



The state of California in United States is a pioneer in adopting cool roofs in warm climates. It is the only state in the United States with energy efficiency guidelines that include requirements for certified cool roofing materials. In California, all new or replacement low-slope roofs are required by the building energy efficiency standards (Title 24) to be cool roofs, as are steep-slope roofs in several California climate zones.

The City of Toronto in Canada Adopted CRP in 2009





For the city of Los Angeles in California, asphalt gravels must meet or exceed a solar reflectance index value of 20 for all re-roof applications in commercial and residential buildings and even for new constructions for the unincorporated Los Angeles County regions. According to the Green Building Standards Code of Los Angeles County, this is also a compulsory condition.

In 2019, the Clean Cooling Collaborative in collaboration with the Global Cool Cities Alliance, Sustainable Energy for All (SEforALL), and Nesta Challenges launched the Million Cool Roofs Challenge. The Million Cool Roofs Challenge awarded nearly \$125,000 in grants to 10 finalist teams based in South Africa, Bangladesh, Cote D'Ivoire, the Philippines, Indonesia, Kenya, Mexico, Niger, Rwanda, and Senegal. In less than two years, collectively, the ten countries managed to apply more than 1.1 million square meters of cool roofs.

(SEforALL), and Nesta Challenges Launched the Million Cool Roofs Challenge

**The Million Cool Roofs Challenge
Awarded \$125,000 to
10 Finalist Teams**

VISION

To make Telangana a thermally comfortable and a heat resilient state.

MISSION

- To ensure a more rapid adoption of cool roofs in the state
- To develop an ecosystem of suppliers, trained man-power, testing centres and materials to support implementation of cool roofs.
- To enable access of cool surfaces to all
- To ensure effective monitoring and evaluation of the cool roof installations

VISION

To make Telangana a thermally comfortable and a heat resilient state.

MISSION

- To ensure faster adoption of cool roofs in the state
- To develop an ecosystem of suppliers, trained man power, testing and materials to support implementation of cool roofs
- Ensure access of cool surfaces to all
- To ensure effective monitoring and evaluation of the cool roof installations

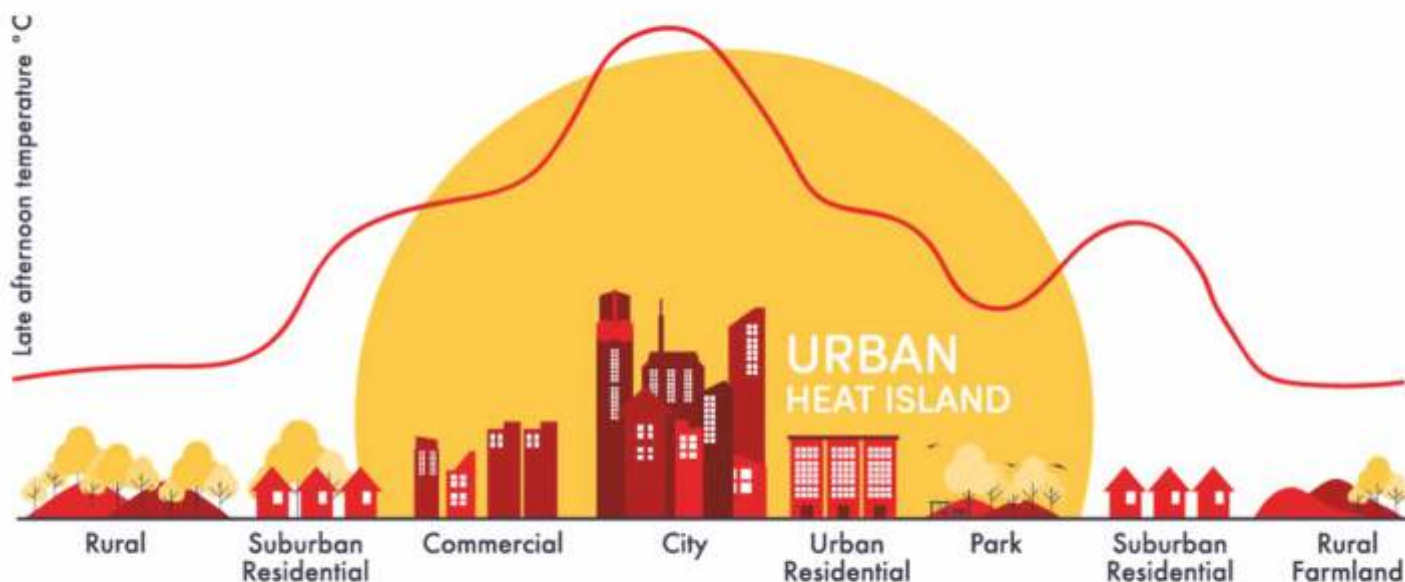
Telangana State Cool Roof Policy aims to meet the following specific objectives:

Drive rapid state-wide adoption of cool roofs to save energy, strengthen heat resilience and increase thermal comfort.

Identify financing frameworks and undertake outreach to spread awareness of building tools for implementing cool roofs.

Create a robust institutional framework to implement the city-wide cool roof application.

Support workforce development and training programs for cool roof installation.



The total area of Hyderabad Urban Agglomeration (HUA) – comprising of the Greater Hyderabad Municipal Corporation (GHMC), all nearby ULBs, Area within ORR and HMDA is over 7000 sq. kms. Assuming a very conservative the eligible roof area for cool roofing to be 3%, the targeted cool roofing area with the current size of the agglomeration would approximately be 200 sq. kms. Taking a simplified assumption that the eligible roof area would be half of the HUA for the rest of Telangana, would imply a cumulative cool roof area of 300 sq. kms for the state.

Annual Targets of Cool Roofs for Hyderabad Urban Agglomeration and Telangana under the Telangana State Cool Roof Policy

Year	Hyderabad Cool Roof Area (sq. kms) Targets for Respective Years	Rest of Telangana Cool Roof Area (sq. kms) Targets for Respective Years	Annual Total Target for Telangana (sq.kms)
2023-24	05	2.5	7.5
2024-25	20	10	30
2025-26	40	20	60
2026-27	60	30	90
2027-28	75	37.5	112.5
Total Aggregated Area by 2028-2029	200	100	300

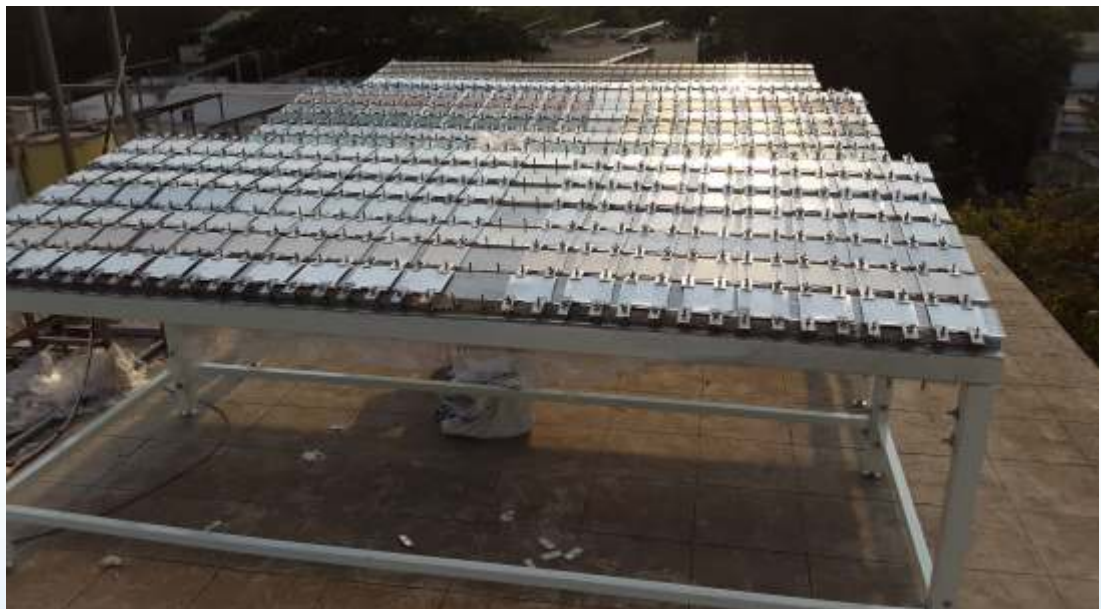
Based on preliminary calculations, conservative estimates show that Telangana could approximately save 600 Million Units (GWh) of electricity per year after 5 years with 300 sq.kms of roof area with cool roofs in the state. Studies show that retrofitting 100 m² of roof has an effect on radiative forcing equivalent to a one-time offset of 10 tonnes of CO₂. This implies that for Telangana cool roofing 300 sq. kms in 5 years would lead to one time carbon offset of 30 million tCO₂.

**Leads to
Carbon Offset of
30 Million tCO₂**





Typical Cool Roof Testing Facilities Credit: Centre for Advanced Research in Building Sciences and Energy, CEPT University



Natural Exposure and Ageing of Cool Roof Specimens- Experiment by International Institute for Information Technology- Hyderabad (IIIT-H)
Credit: IIIT-H

Cool Roof Programme shall be implemented covering following building typologies as part of program implementation strategy:

A. Mandatory:

Government, Non-Residential & Commercial Buildings: Mandatory cool roofing for all the Government, Government-owned, Non- Residential and Commercial buildings irrespective of site area / built-up area.

Residential: Mandatory cool roof application for all the residential buildings that have plot area of 600 sq.yds and above. Optional / voluntary for the buildings that have plot area of less than 600 sq.yds.

Government assisted Housing Scheme: Cool roofing for all Government low income housing constructions.

B. Optional:

- Buildings that have installed roof top solar systems, may also adopt cool roofs for better thermal comfort.
- Retrofitting of all non-residential buildings in next 3 years.
- All residential buildings in plots of < 600 sq.yds also to adopt cool roofing.

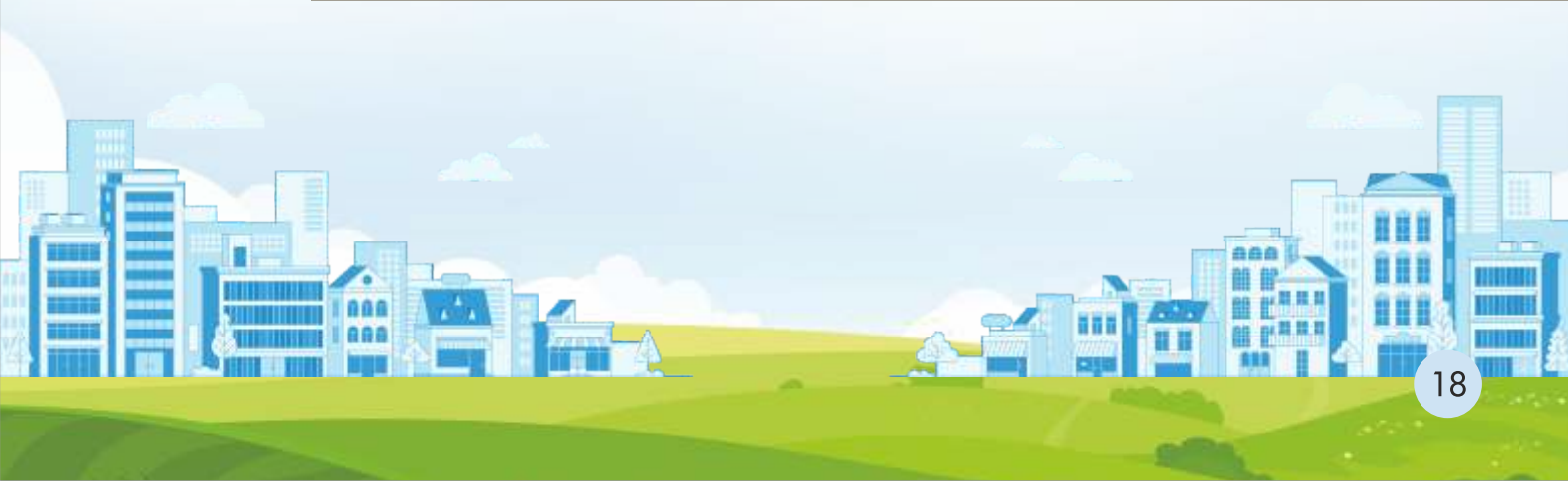




This policy is applicable for a period of 5 years from the date of notification of this policy. The policy shall be reviewed by MA&UD department as and when required.



GHMC in GHMC area, HMDA in Hyderabad Urban Agglomeration Area (other than GHMC) and DTCP for the rest of the State is appointed as the Nodal Agency for the effective implementation of the cool roof application across the State and TSbPASS will coordinate overall from the implementation point of view.





In Telangana, the following typologies of buildings including government, non-residential & commercial, residential and low-income communities in the jurisdiction of ULBs and UDAs would be targeted as part of the implementation strategy of this policy.

A. GOVERNMENT BUILDINGS

Adoption and implementation of cool roof installation in all the existing and new government buildings shall be mandatory. With government spearheading the Telangana Cool Roof Policy, it is important for all the government buildings and structures, new and existing, to mandatorily adopt cool roofs. The key driver for government buildings is to spur adoption of cool roofs with the benefits of thermal comfort, energy savings and reduction of heat island affect.

Types of Buildings Included:

All the government, quasi government and government owned buildings such as offices, educational institutions, public transport (bus stations/ bus stops), convention centres, community halls, hotels, resorts, hospitals, clinics and healthcare etc.

Outreach and Awareness Measures to be Undertaken as Part of the Policy Implementation:

- Government outreach programs highlighting the program and benefits including thermal comfort and energy savings from cool roofs
- Government meetings highlighting the new cool roofs program
- Media articles on the new cool roofs program
- Dissemination of knowledge material on cool roofs technology, applications and materials and suppliers



B. NON- RESIDENTIAL AND COMMERCIAL BUILDINGS

All Non – Residential and commercial buildings include those mentioned in building bye laws. This building type includes offices, such as IT companies, SEZs, retail complexes/shops, malls, hotels, convention centres/ banquet halls, function halls, industrial buildings, private educational and healthcare etc shall implement the cool roof application as a mandatory provision.

The key driver for adoption of cool roofs for commercial category buildings is reducing cooling load, energy demand and air conditioning energy savings.

The Government of Telangana notified the mandatory compliance to the Telangana Energy Conservation Building Code (TSECBC) through building byelaws. The Telangana ECBC applies to any commercial building or building complex that has a plot area of 1,000 square meters or more, or a built-up area of 2,000 square meters or more.

The state also has an online platform for building applications, the Telangana State Building Permission Approval and Self-Certification System (TS-bPASS). The online TS-bPASS integrated the TSECBC requirements into the online process for building permits, making the ECBC mandatory for commercial building. In order to ensure adoption of cool roofs by the commercial buildings, the TSECBC includes cool roofs in new construction. However, the commercial buildings that are not covered under the mandatory ECBC compliance also shall have to adopt cool roof application as a mandatory where a special provision is integrated in the TS-bPASS to check the compliance during the Occupancy.











The empanelled ECBC TPAs authorised to issue cool roof compliance for all the commercial buildings as mentioned below:

For ECBC Complied Buildings: the TPAs shall include the text “cool roof is applied” on the prescribed existing ECBC compliance certificate (Occupancy Stage).

Other Commercial Buildings: For all the commercial buildings that are not under the purview of ECBC, respective ULB officials will verify the cool roofs application before issuing the occupancy certificate.

Outreach and Awareness Measures:

An outreach and awareness building programs (listed below) would be implemented by the Nodal Agency. These programs can be designed by knowledge partners of the cool roof policy. Such programs will be undertaken along with the Real Estate Associations, Association of Architects etc.

-  Awareness program with local welfare associations
-  Presenting the program at trade shows and conferences
-  Website and social media campaign
-  Distributing flyers and posters
-  Ads through bill boards/ hoardings across the cities
-  Awareness generation through focused events on low-cost installation of cool roofs for building owners
-  Preparation of a how-to manual on installing cool roofs and other knowledge materials
-  Engage volunteers from companies to coat rooftops.

C. RESIDENTIAL BUILDINGS







The residential buildings are those which are mentioned in the building byelaws or not categorised as non-residential and commercial buildings in the building bye laws.

The key driver for this segment of the population staying in these buildings in addition to the thermal comfort would be the cooling load reduction and resulting energy savings.

For the residential buildings that have plot area of more than or equal to 600 sq.yd, cool roof is mandatory and special provision in the TS-bPASS shall be integrated. Respective ULB officials will verify the cool roofs application before issuing the occupancy certificate to such buildings. For the residential buildings, that have plot area of less than 600 sq.yd, the adoption of cool roofs would be voluntary but facilitated by periodic outreach and awareness measures on cool roofs, led by city level authorities like ULBs and UDAs or Nodal Agency.

Outreach and Awareness Measures:

The nodal agency of the cool roof policy along with city level authorities like ULBs and UDAs will undertake massive outreach and awareness building programs. These programs will be designed by knowledge partners of the cool roof policy. Such programs can be undertaken along with Real Estate Associations, Association of Architects, and Resident Welfare Associations.

-  Awareness program with local resident welfare associations
-  Presenting the program at trade shows and conferences
-  Website and social media to support the program
-  Distributing flyers and posters to spread the work and other knowledge material
-  Ad through bill boards across the city
-  Awareness generation through focused events on low-cost installation of cool roofs for building owners

D. GOVERNMENT SUPPORTED DIGNITY HOUSING PROGRAMMES

In dignity housing programmes, cool roofs keep indoor temperatures lower and increase thermal comfort. In extreme heat conditions, cool roofs help to build resilience to heat waves and better cope with impacts of extreme heat.

The driver for this segment of the population for cool roofs is decreased indoor air temperatures and increased thermal comfort. Additionally, since for a large proportion of these households, their homes are also their place of work, increased thermal comfort due to cool roofs, would also lead to enhanced productivity.

In order to implement the cool roofs in such localities two mechanisms will be deployed.

- For Government financed low-income housing projects, incorporation of cool roofs as a mandatory material in all new and existing government low-cost housing projects.
- For cool roofs implementation in low-income households not covered under government funded low-income housing projects, a program of implementation led by city level authorities like ULBs and UDAs through the Heat Action Plan.

Outreach and Awareness Measures:

- To ensure implementation of program in low income areas, the nodal agency, will undertake awareness campaign on benefits of cool roofs, also highlighting the maintenance needs. This needs to be coupled with spreading the word on the program through advertisements through bill boards/hoardings across the state.



11 | PROCESS OF IMPLEMENTATION

The clause requiring cool roofing shall be incorporated in the TSbPASS for all mandatory cases and it will have to be certified by empanelled agencies at the time of issuing Occupancy Certificates (Ocs). The list of such empanelled agencies shall be issued by MA&UD Dept. separately.

An illustrative list of agencies dealing with cool roofing, their installations and O&M shall be prepared by MA&UD Dept. and notified on its website. Builder/developers are at liberty to get it installed from any of the empanelled agencies.



The choice of an appropriate cool roof material in a particular context would be dependent on a range of factors, from existing roof material, life and maintenance, availability, cost, time needed for installation and availability of skilled labor. To help cater to a range of contexts, cool roofs techniques can be broadly divided into three categories and building owners can choose from these techniques as appropriate for implementing cool roofs.

COATED COOL ROOFS: These roofs involve the coating of a material or paint with high reflectivity on top of a conventional roof material to increase the roof surface's Solar Reflective Index (SRI). These are liquid applied coatings made of simple materials such as lime wash, or an acrylic polymer or plastic technology and are usually white in color.

MEMBRANE COOL ROOFS: These roofs involve using pre-fabricated materials such as membranes or sheeting to cover an existing roof in order to increase the roof surface's solar reflectance and thermal emittance. These types of roofs can be polyvinyl chloride (PVC) or bitumen-based.

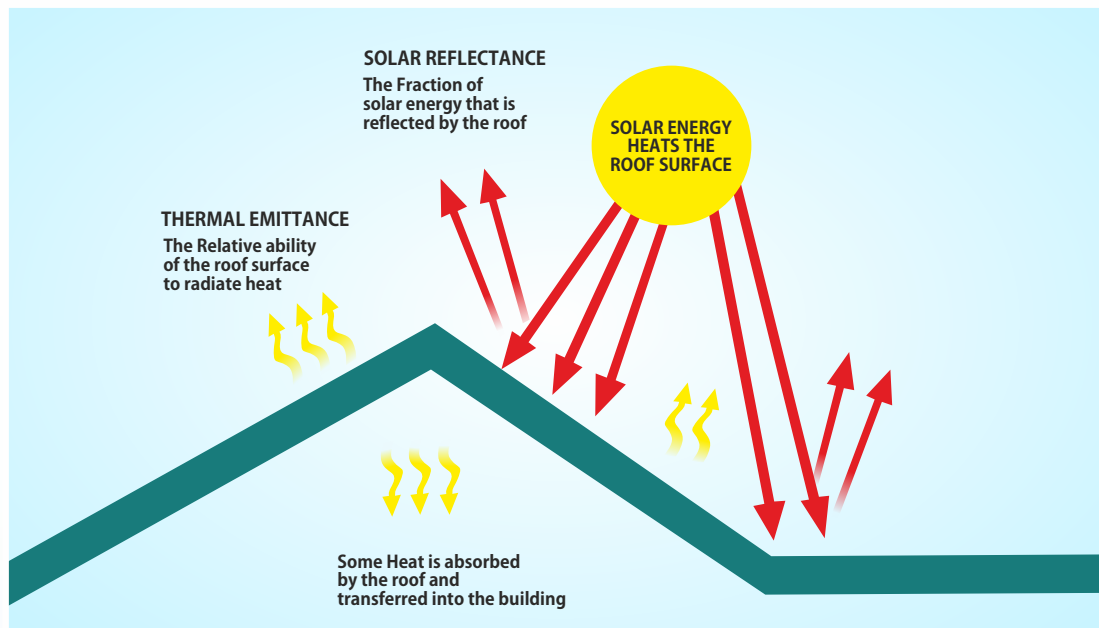
TILED COOL ROOFS: These roofs involve the application of high albedo, ceramic mosaic tiles or shingles on top of an existing roof or to a new roof.



MINIMUM REQUIREMENTS COOL ROOF MATERIALS

Any roofing material is eligible as long as it meets the requirements of the Telangana Energy Conservation Building Code (TSECBC). For qualifying as a cool roof, roofs with slopes less than 20° shall have an initial solar reflectance of no less than 0.70 and an initial emittance no less than 0.75. Solar reflectance shall be determined in accordance with ASTM E903:2020, emittance shall be determined in accordance with E408-71 (2008).

In lieu of the cool roofs material mentioned here, the policy also supports green roofs and rooftop solar systems. Green roofs make use of vegetation to help the roof absorb less solar energy by providing a thermal mass layer to reduce flow of heat into a building. Vegetation is especially useful in reflecting infrared radiation.



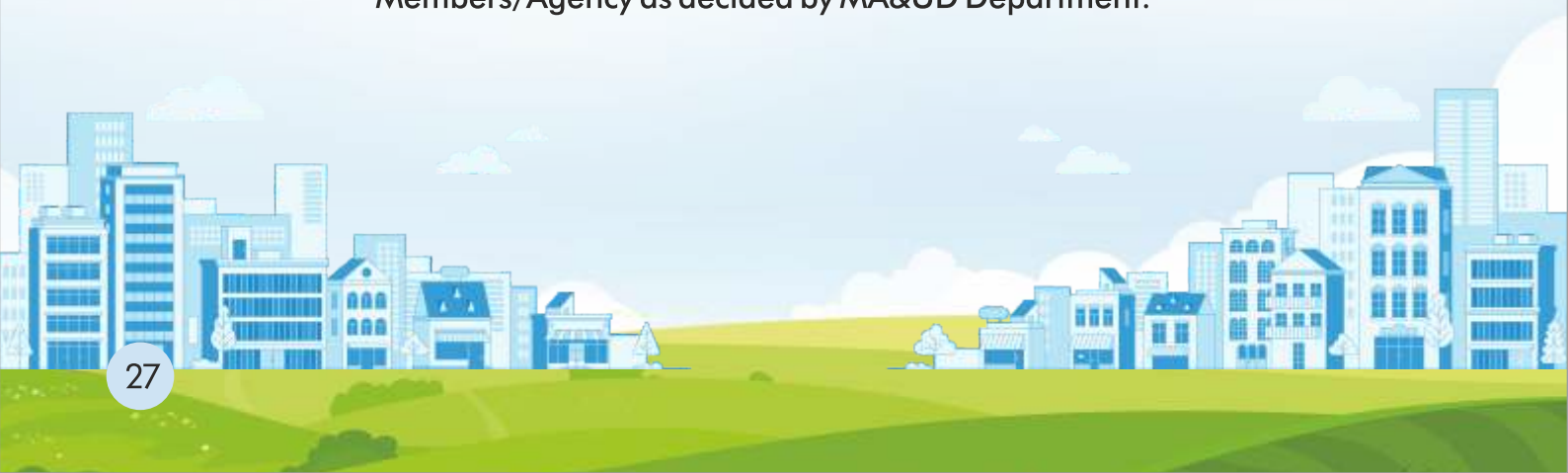


For a collective impact to reduce the urban heat island effect, the cool roof policy for the state will be implemented through a robust interagency coordination mechanism, replicated at the city level. The successful implementation of the policy will require collective effort from different state and city level agencies as well as technical, research, NGOs, civil society organizations and private companies.

The Policy is being rolled out by Municipal Administration and Urban Development Department (MAUD) of the state of Telangana. The ULBs are responsible for the policy implementation.

The policy design to be led and overseen by a Cool Roofs Committee. A committee shall be constituted by MA&UD Department with members from:

- Energy Department
- Roads and Buildings Department
- Housing Department
- Directorate of Town and Country Planning,
- Urban Local Bodies (ULBs)
- Real estate developer bodies such as CREDAI, NAREDCO
- Academic experts such as Administrative Staff College of India (ASCI), International Institute of Information Technology (IIIT-H), Natural Resources Defense Council (NRDC), Plaksha University and any other Members/Agency as decided by MA&UD Department.



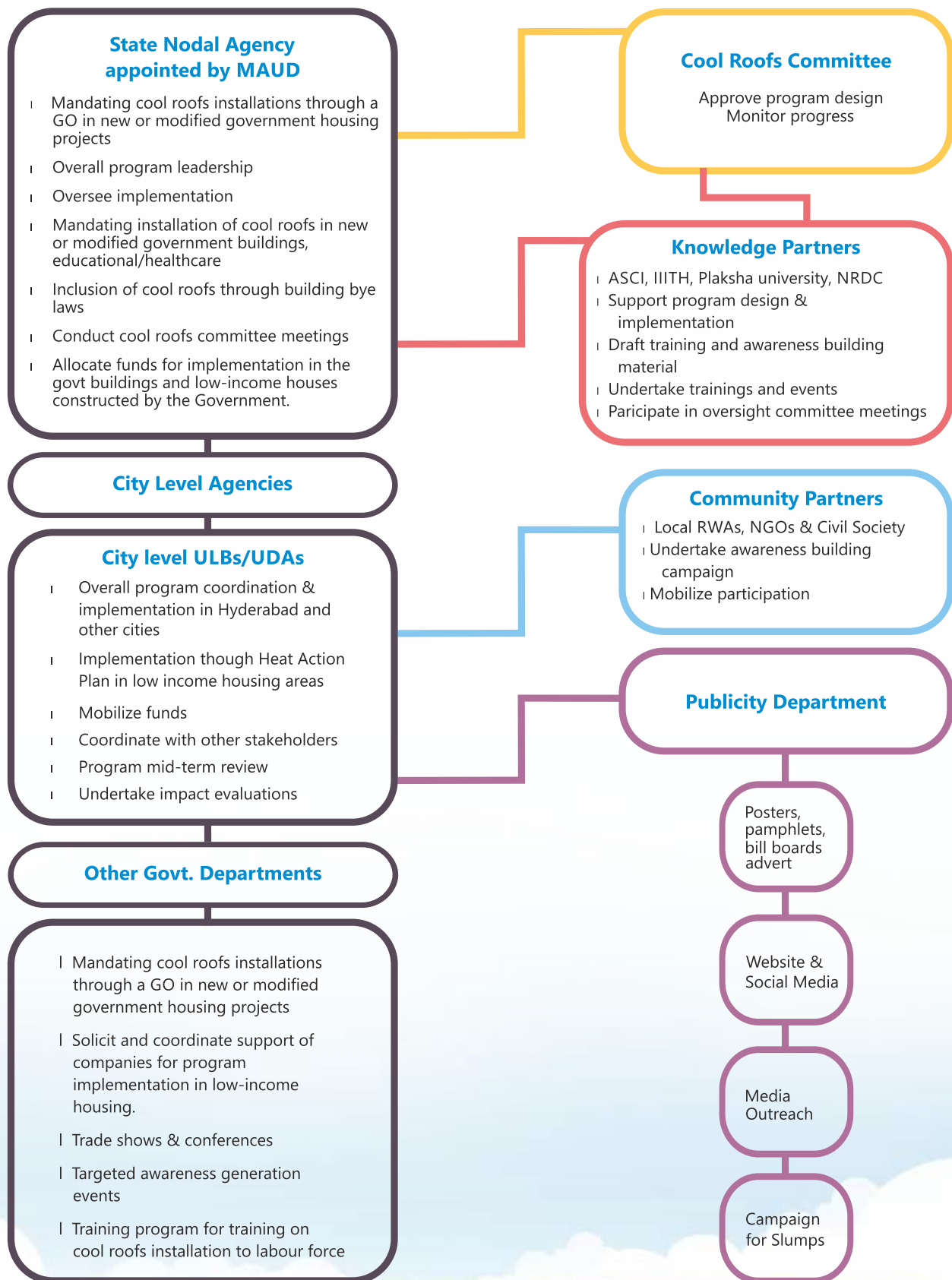
The appointed nodal agency for the policy will lead the overall program implementation and oversee policy progress. It will be responsible for mandating the cool roofs by following statutory instruments where required and allocate funds for implementation by building type, where applicable and if needed. The nodal agency may also empanel cool roofs manufacturers/suppliers/implementers.

The city level implementation will be led by the respective ULBs in the city. In case of Hyderabad, it is the GHMC and HMDA that will be the city implementation agency responsible for overall program coordination and implementation. The city implementation agency will also mobilize funds required for example implementation of cool roofs in low-income housing through the heat action plans. ULBs will also coordinate and conduct the meetings of the cool roofs committee and undertake program review and impact evaluation. It will submit periodic program implementation reports to MAUD and the cool roofs committee.

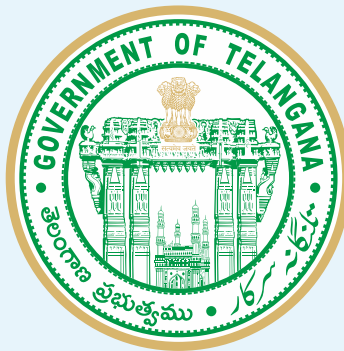
The ULB coordinate with the I&PR Department to undertake outreach and communication activities for the cool roofs policy with the help of knowledge partners. The knowledge partners will also support the ULBs in overall program implementation where required such as identifying technical criteria, developing training and communication material etc. ULBs will also seek support from community partners such as the local RWAs, NGOs and civil society organization for undertaking awareness building campaigns and mobilizing participation. In addition, the ULBs will also coordinate with other departments for implementation of aspects related to the program. The knowledge partners will support the ULBs in identifying and defining the role of other city departments for program implementation.



FIGURE 1: PROPOSED AGENCIES FOR IMPLEMENTATION OF THE COOL ROOF POLICY-TELANGANA







KNOWLEDGE PARTNERS



